Red Hat
Advanced Cluster Management
for Kubernetes

# Red Hat Advanced Cluster Management for Kubernetes

Alfred Bach

Red Hat

Tech Preview

# Introducing!
# Red Hat Advanced Cluster Management for Kubernetes

## Robust, Proven, Award Winning

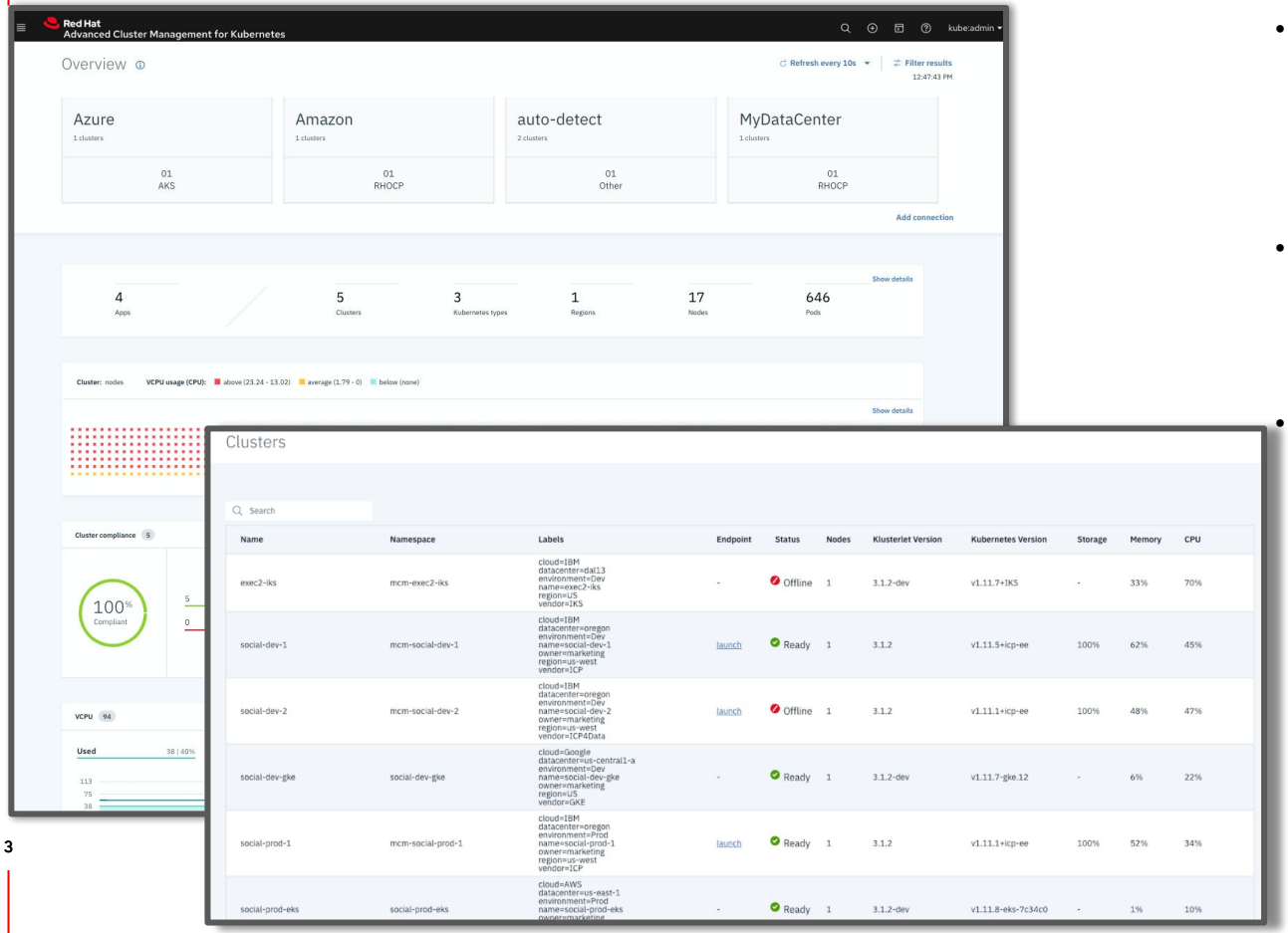
Multicluster Lifecycle Management

Policy Driven Governance, Risk and Compliance

Advanced Application Lifecycle Management

# Unified Multi-Cluster Management

Single Pane for all your Kubernetes Clusters




- **Centrally** create, update and delete Kubernetes clusters **across multiple** private and public clouds
- Search, find and modify **any** kubernetes resource across the **entire** domain.
- **Quickly** troubleshoot and resolve issues across your **federated** domain



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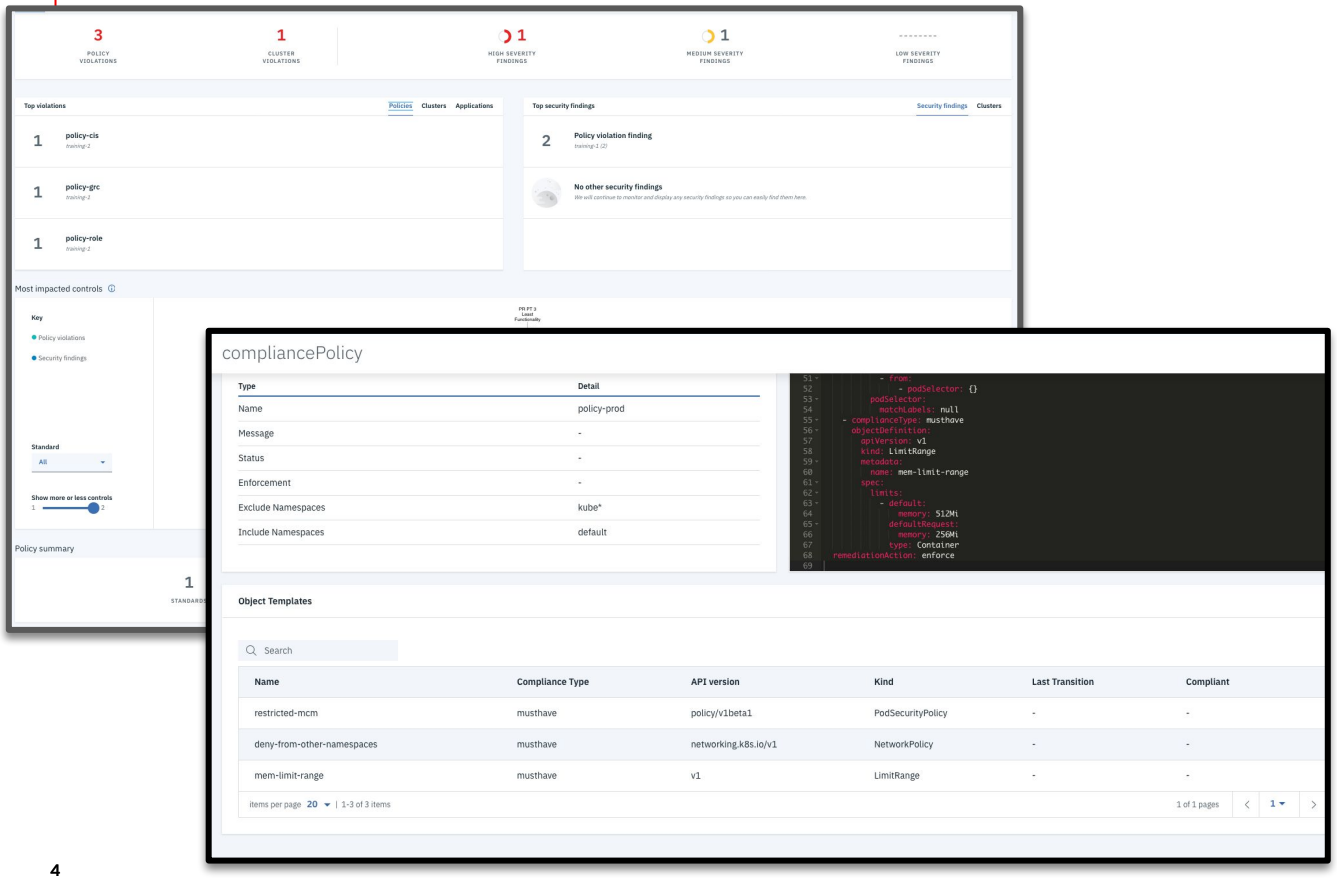
# Policy based Governance, Risk and Compliance

Don’t wait for your security team to tap you on the shoulder




- **Centrally** set & enforce policies for security, applications, & infrastructure
- Quickly **visualize** detailed **auditing** on configuration of apps and clusters
- Built-in **CIS** compliance policies and audit checks
- **Immediate** visibility into your compliance posture based on **your** defined standards



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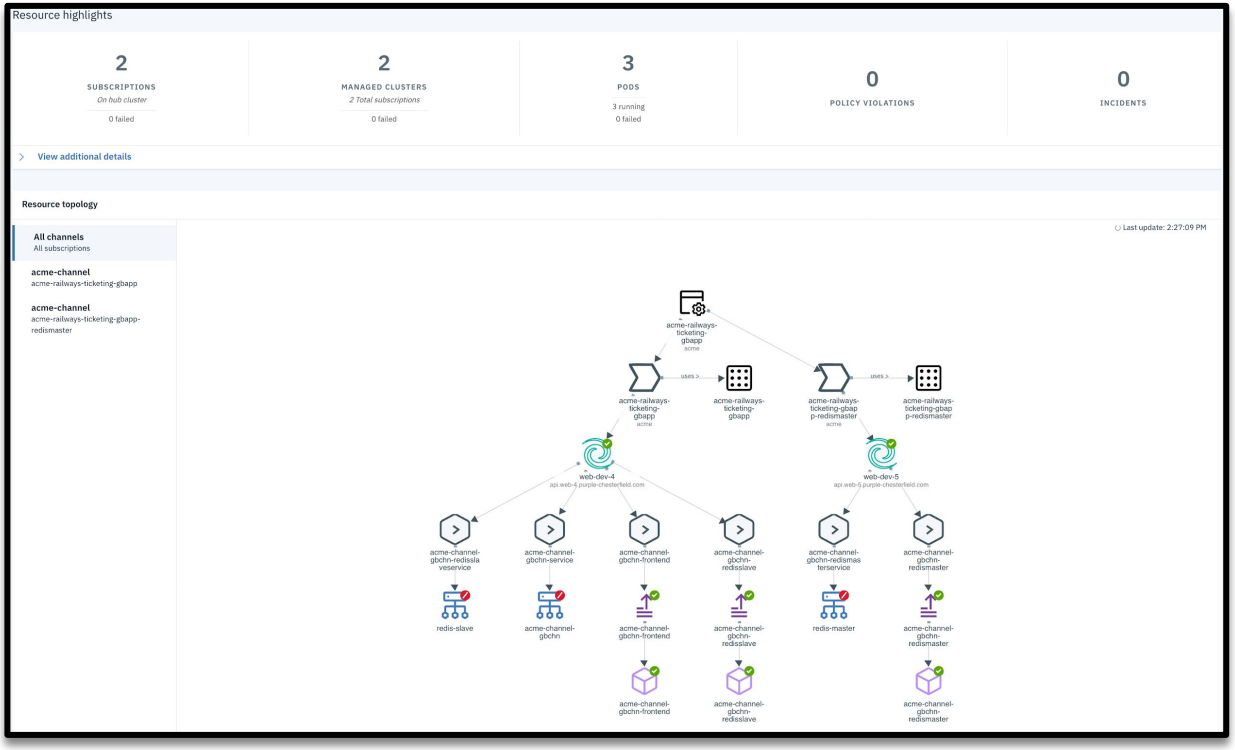
# Advanced Application Lifecycle Management

Simplify your Application Lifecycle




- **Easily** Deploy Applications at **Scale**
- Deploy Applications from **Multiple** Sources
- Quickly **visualize** application relationships **across** clusters and those that **span** clusters



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# Benefits

## Red Hat OpenShift and Red Hat Advanced Cluster Management for Kubernetes

### Accelerate Development to Production

Self-service provisioning  allows app dev teams to request clusters directly from a catalog removing central IT as a bottleneck.

### Ease Compliance

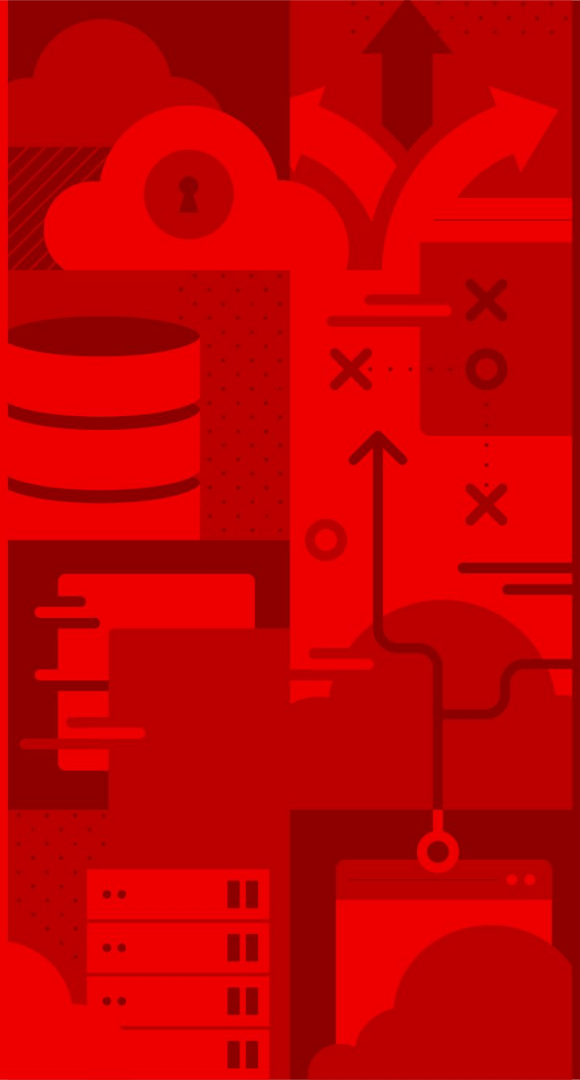
Policies can be written by the security team and enforced at each cluster, allowing environments to conform to your policy

### Increase Application Availability

Placement rules can allow quick deployment of clusters and applications across distributed locations for availability, capacity, and security reasons.

### Reduced Costs

Centralized management of clusters reduces operational cost, makes the environment consistent, and removes the need to manually manage individual clusters.



# Detailed Use Cases

# Multi-Cluster Lifecycle Management

| | |
|---|---|
|  <br>**IT Operations** | How do I get a simplified understanding of my cluster health and the impact it may have on my application availability ?<br>How do I automate provisioning and deprovisioning of my clusters? |
|  <br>**DevOps/SRE** | How can I manage the life cycle of multiple clusters regardless of where they reside (on-prem, across public clouds) using a single control plane? |

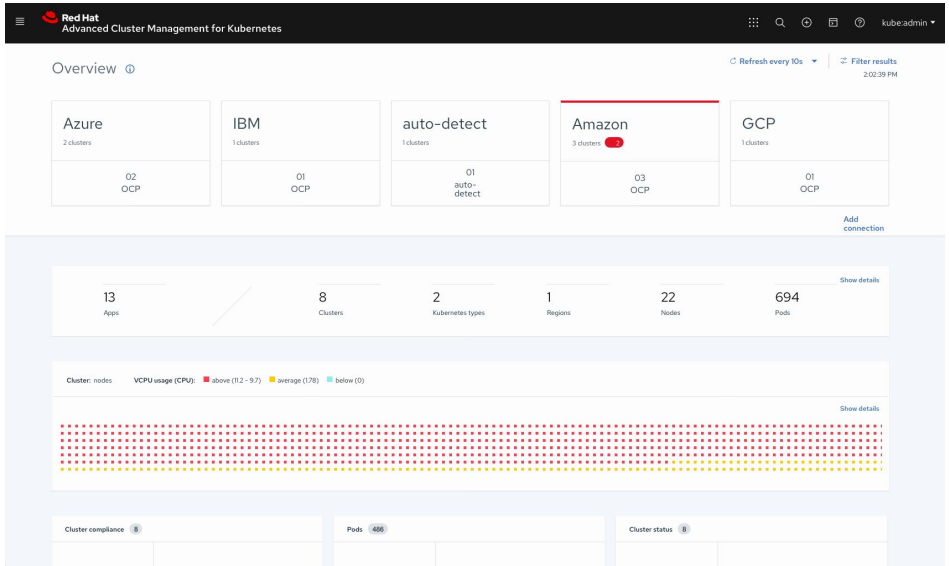
# Multi-Cluster Lifecycle Management

## Overview

IT Operations

DevOps/SRE

- Manage any Kubernetes compliant cluster
  - OpenShift 3.11, 4.1.x - 4.4.x
  - Public cloud hosted: OCP
  - Public cloud managed kubernetes: EKS, AKS, GKE, IKS
- Search, find and modify kubernetes resources across the management domain.
- IT Management as code with **YAML**
- See high level summaries across all clusters
  - Misconfiguration
  - Pod status
  - Resource capacity
- Troubleshoot and resolve issues across the federated domain
  - See in dashboard or via a list/table form
  - Table shows custom tagging
  - Regions
  - Business Purpose
  - Version



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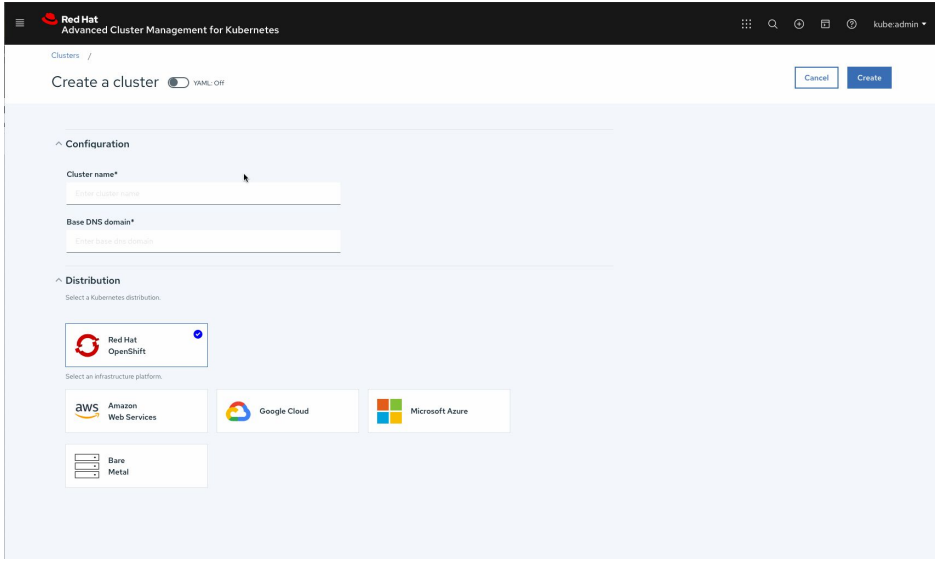
# Multi-Cluster Lifecycle Management

## Creating & Importing Clusters

IT Operations

DevOps/SRE

- **Create**, **Upgrade** and **Destroy** OCP clusters running on **Bare-metal** as well as public cloud
- Leverage **Hive** API for OCP cluster deployment
- Wizard or YAML based create cluster flow
- Launch to an OCP Console from ACM
- Access cluster login credentials and download kubeadmin configuration



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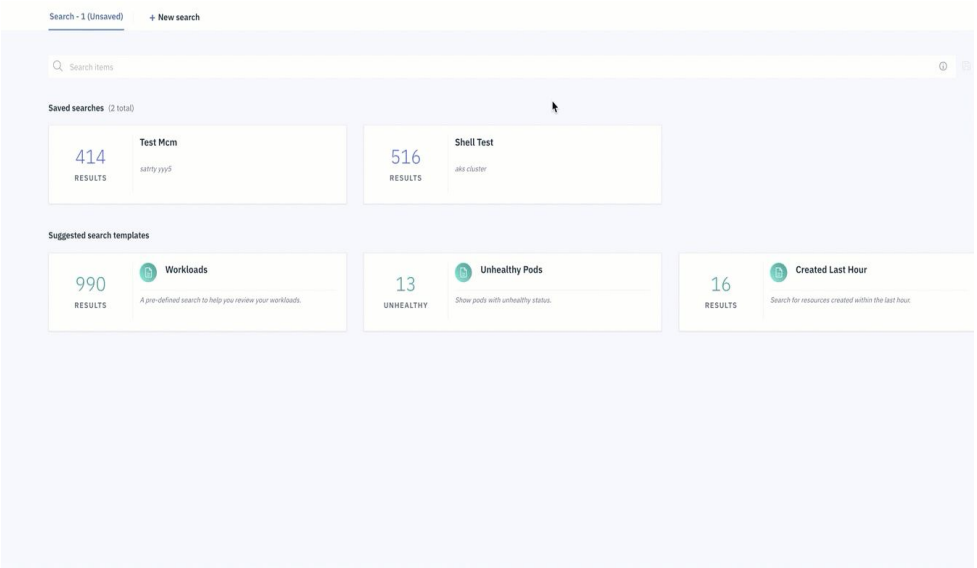
# Multi-Cluster Lifecycle Management

## Dynamic Search

IT Operations

DevOps/SRE

- Troubleshooting across clusters via relationships
- See all **unhealthy** pods
- See related application models to those pods
- See related Persistent Volumes
- See related secrets
- See related ***any*** kube resource object category



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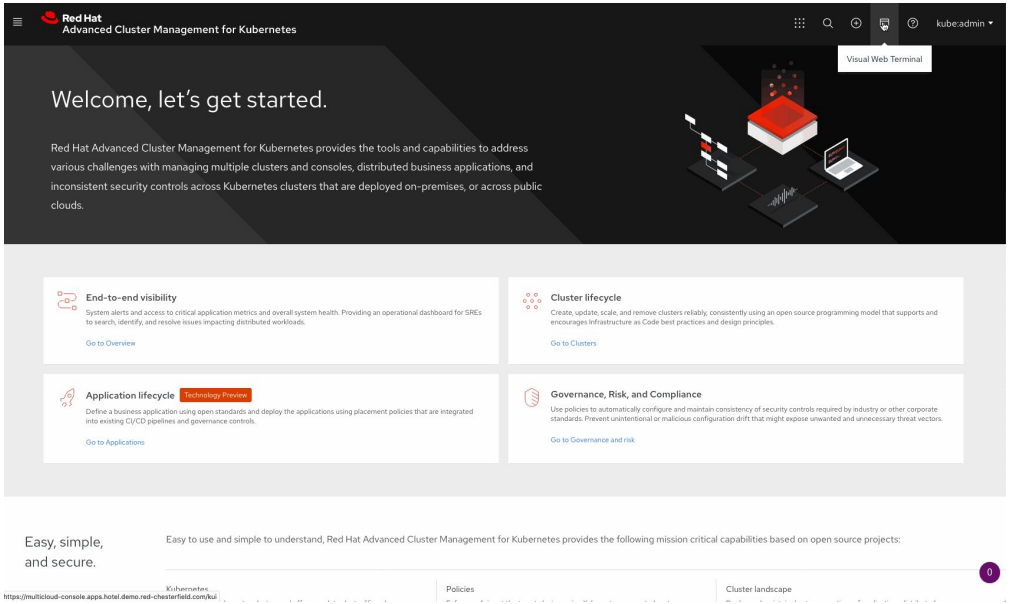
# Multi-Cluster Lifecycle Management

## Visual Web Terminal

IT Operations

DevOps/SRE

- Interactive terminal combines command input with visual output
- One **Terminal** for **all**
- Works with **helm**, **kubectl**, oc, **istioctl**
- Single interface for multi-cluster
- Drive ops directly from dashboards
- Bash commands allow for grep



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# Policy Driven Governance Risk and Compliance

| | |
|---|---|
|  Security OPS | • How do I ensure all my clusters are compliant with standard and custom policies?<br>• How do I set consistent security policies across diverse environments and ensure enforcement?<br>• How do I get alerted on any configuration drift and remediate it? |
|  IT Operations | • How do I ensure 99.9 % Uptime?<br>• How do I drive more innovation at scale? |

# Policy Driven Governance Risk and Compliance

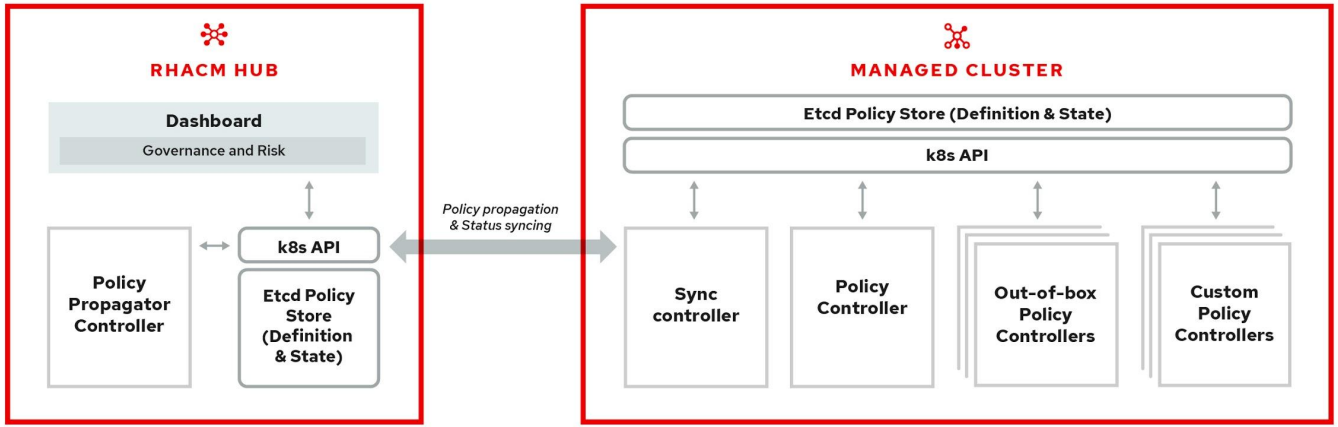
## Architecture Overview

Security Ops

IT Operations

### Managed Cluster and GRC Controllers

- Driven by Kubernetes CRDs and controllers
- Governance capability for managed clusters covering both security and configuration aspects.
- Out of box policies and an extensible policy framework



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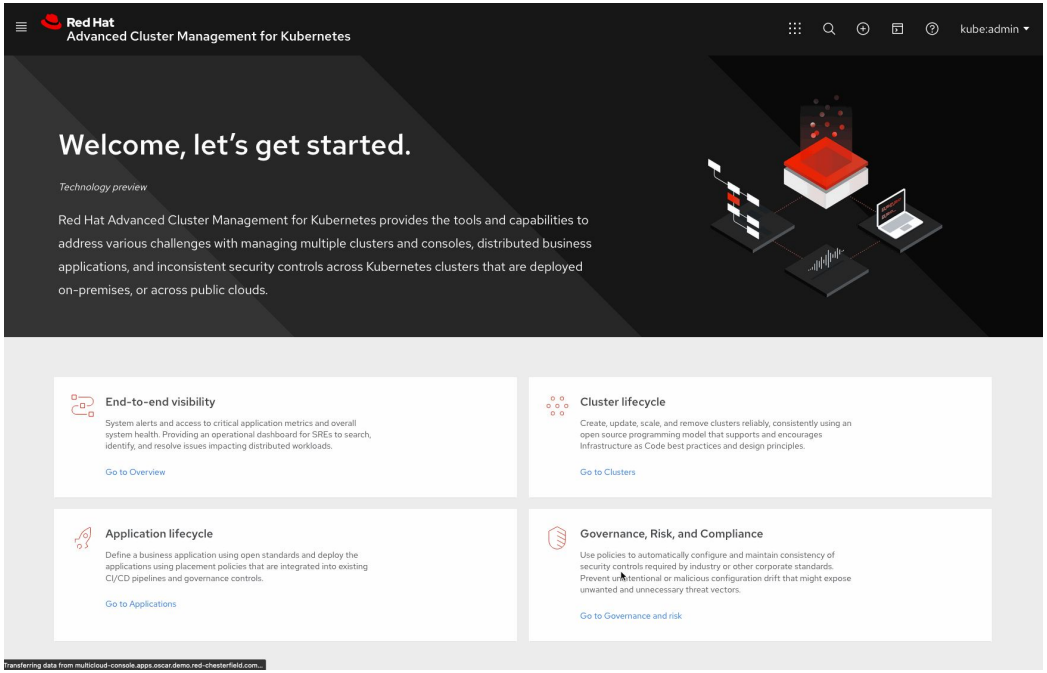
# Policy based Governance, Risk and Compliance

## Don’t wait for your security team to tap you on the shoulder

Security Ops

IT Operations

- Set and enforce policies for security, applications, & infrastructure
- Deep visibility for auditing configuration of apps and clusters
- Unique policy capabilities around CIS compliance
- Categorize violations based on your standards for immediate visibility into your compliance posture



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# Policy based Governance, Risk and Compliance

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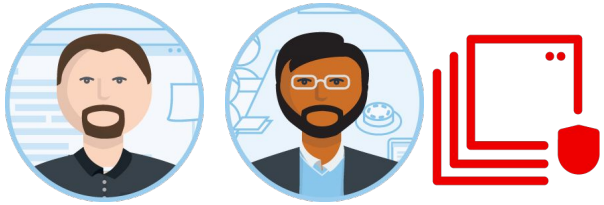
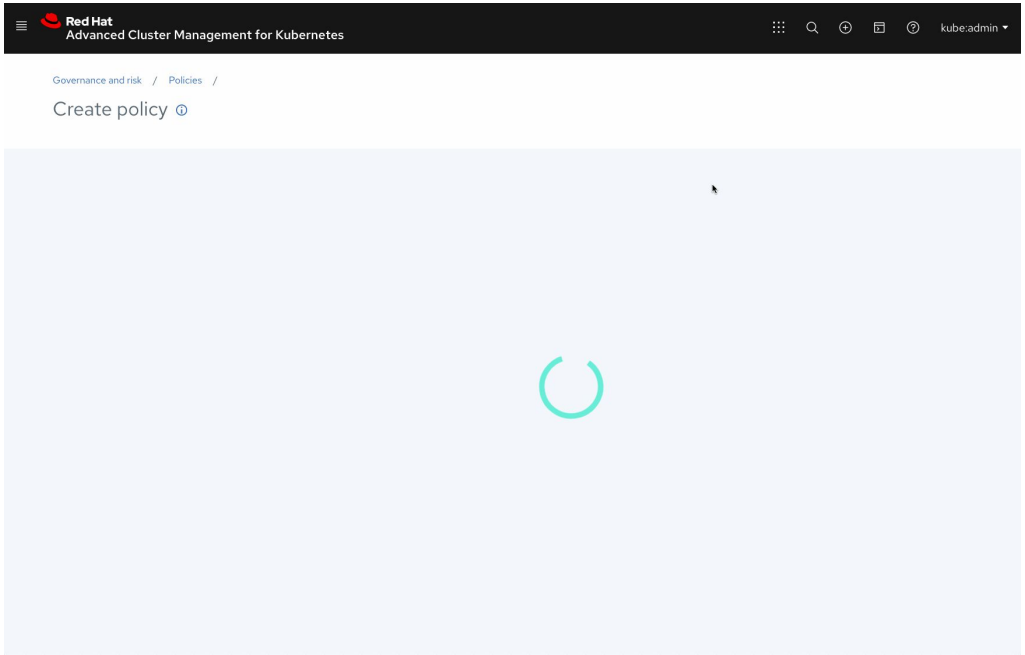



- Standard Policies out of the box
  - FISMA
  - HIPAA
  - NIST
  - PCI
- Leverage Different Categories to Represent more standards (if Needed)
- Use Labels to enforce policies against clusters
- Use **inform** to view policy violations
- Use **enforce** to view violations and automatically remediate



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# Advanced  Application Lifecycle Management

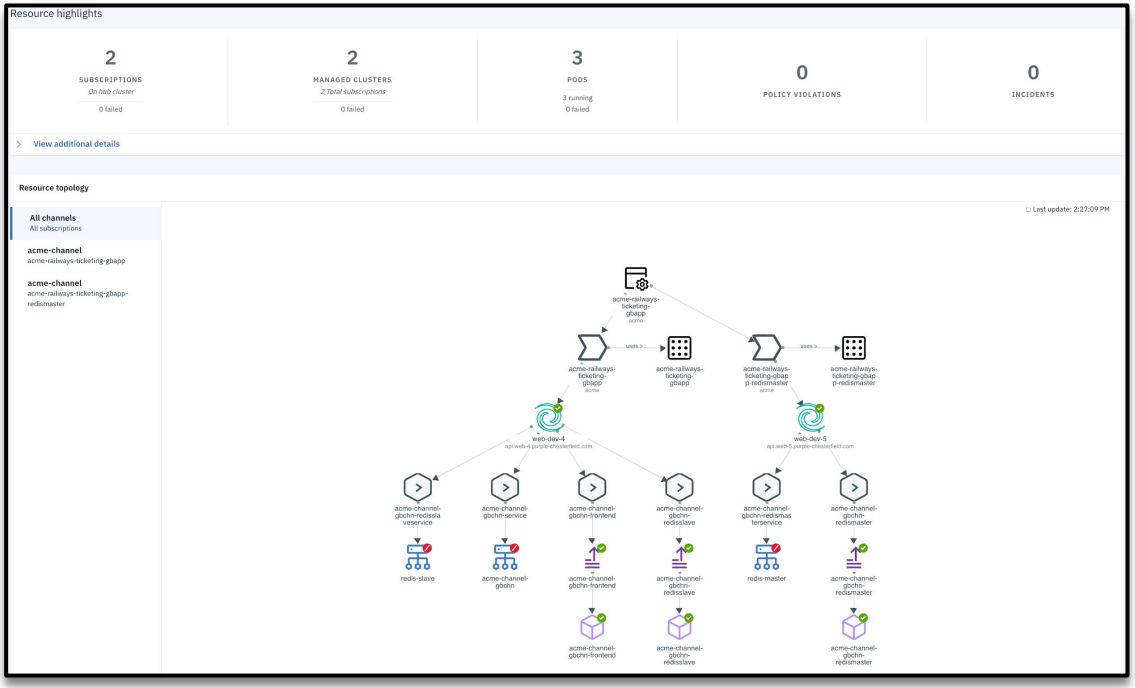
| | |
|---|---|
|  DevOps/SRE | • I want to quickly investigate application relationships with real time status, so that I can see where problems are.<br>• With the Application Topology view, I can visually inspect application status labels and pod logs to understand if a part of the application is running or not, without having to connect to a cluster and gather any info. |
|  IT Operations | • I want new clusters to be deployed with a set of known configurations and required applications.<br>• With the assignment of a label at cluster deploy time, the necessary configurations and applications will be automatically deployed and running without any additional manual effort. |

# Advanced Application Lifecycle Management

## Simplify your Application Lifecycle

DevOps/SRE IT Operations

- Deploy Applications at Scale
- Deploy Applications from Multiple Sources and Clusters
- Quickly Visualize Application Relationships
- Using the subscription & channel model, the latest application revisions are delivered to appropriate clusters, automatically.



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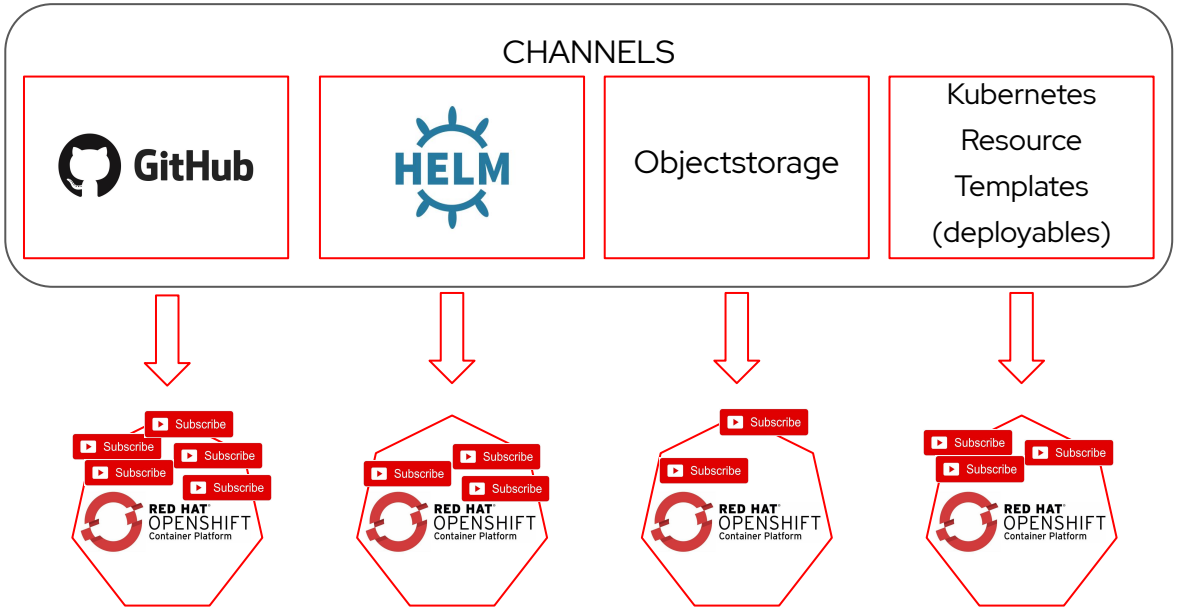
# Advanced Application Lifecycle Management

## Subscriptions Bring Enterprise to Kubernetes

DevOps/SRE

IT Operations

- Extending the best of Enterprise into a desired state methodology
- Time Windows: New releases during your maintenance windows
- Rolling Updates: Control the rate and load on your growing infrastructure



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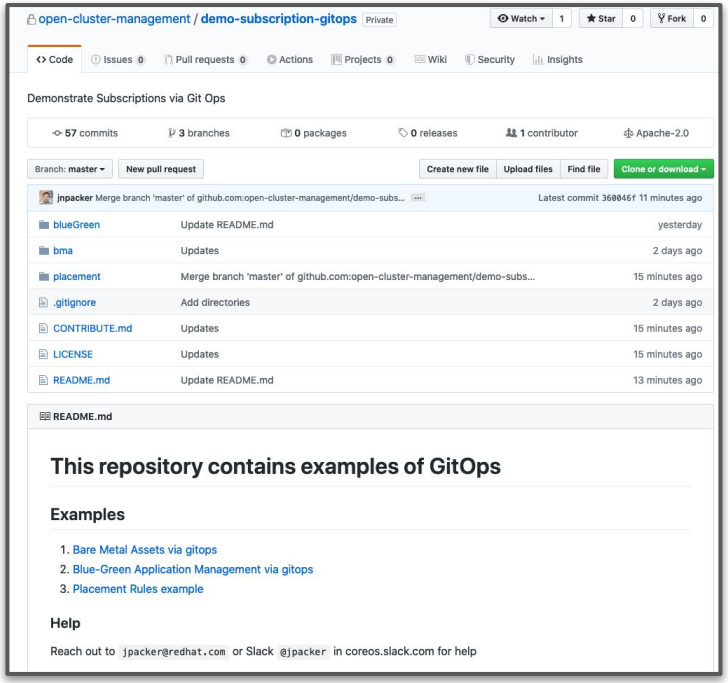
# Advanced Application Lifecycle Management

## GitOps as the source of truth

DevOps/SRE IT Operations

- Create, modify & delete, just as you would any source code. Git becomes your source of truth controlling your data center.
- Have a record of who, what & when for every change precipitated in your environments
- Through code Reviews & Approvals, take full control of all changes to your data center(s)
- Restore your environment, via the Git commit history (system of record)




https://github.com/open-cluster-management/demo-subscription-gitops



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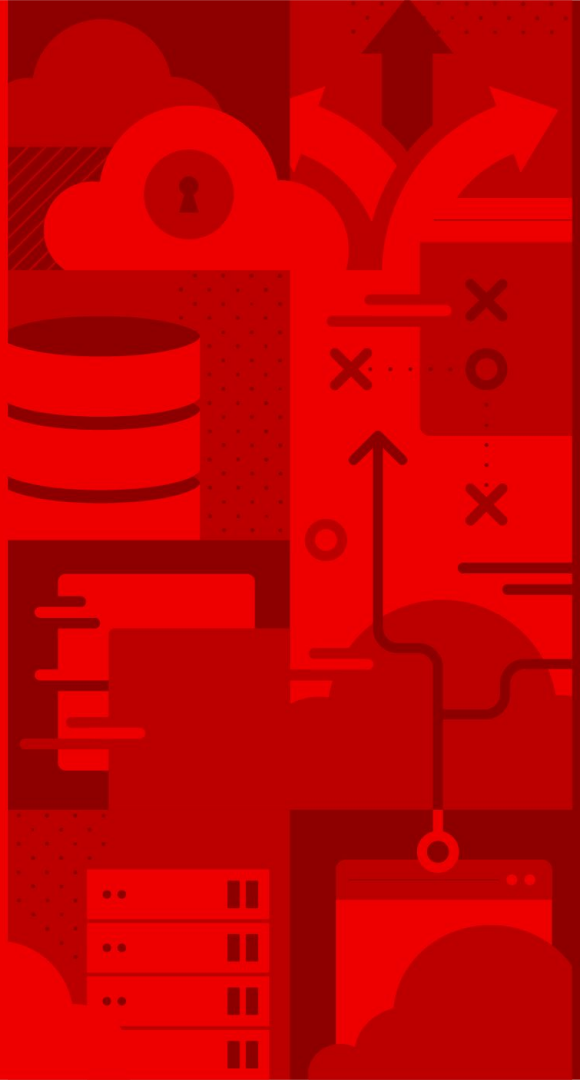


# How it works with Openshift

# Supporting Application Modernization

**Red Hat** OpenShift Container Platform

**Red Hat** Advanced Cluster Management for Kubernetes

**Red Hat** Ansible Automation Platform

**cloud.redhat.com**

## RUN:

Cluster Services : Metrics, Chargeback, Registry, Logging

Advanced infrastructure functionality

Dev Services: Dev tools, Automated Builds, CI/CD, IDE

## MANAGE:

Multicluster & Kubernetes lifecycle management

Policy-based governance, risk, & compliance

Application lifecycle management

## AUTOMATE:

Config Management

Workflow orchestration

Network & security automation

Automation analytics

Certified content

Automation Services Catalog

## OBSERVE:

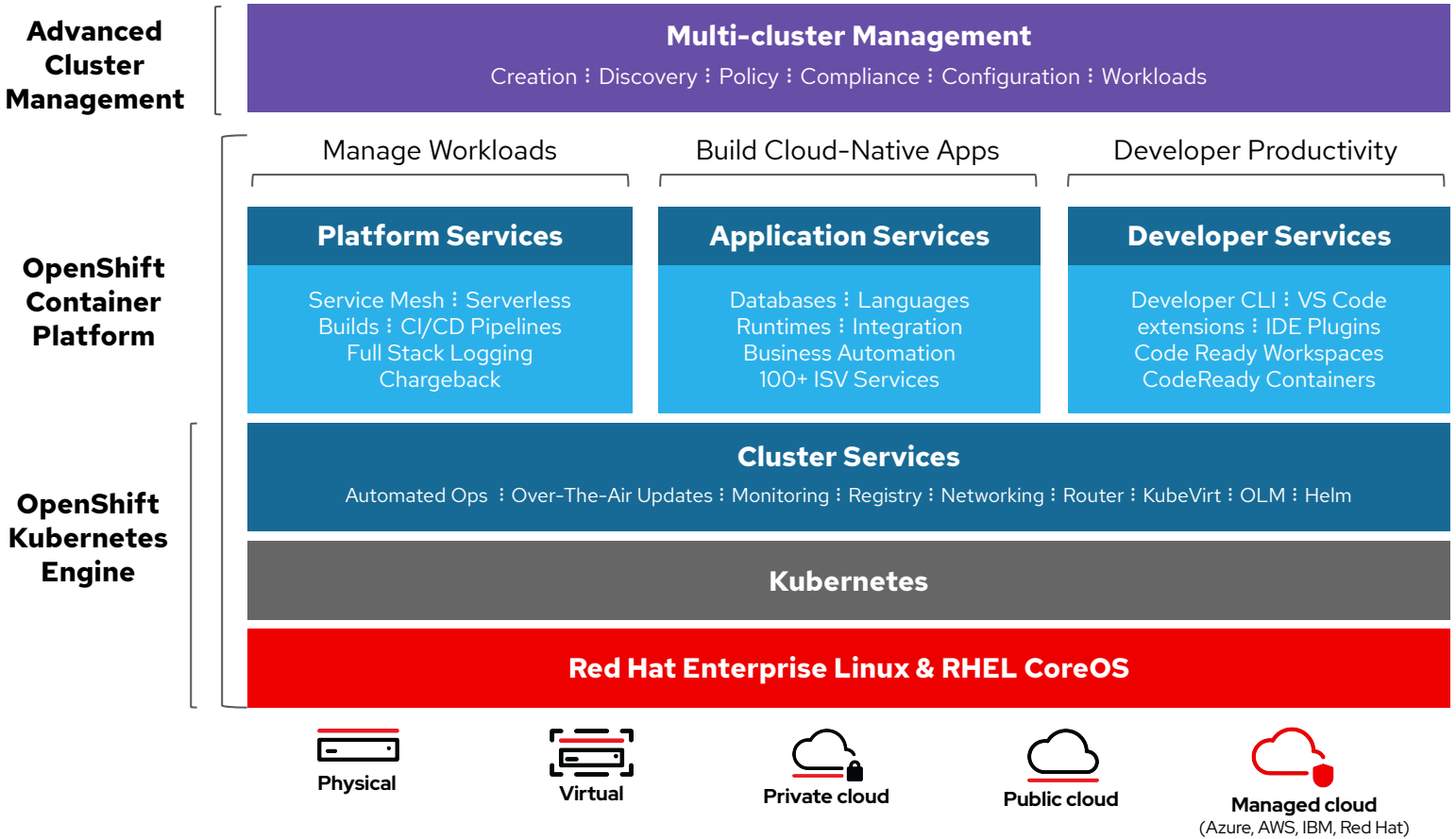
Red Hat Insights

Cost management

Connected Customer Experience

Subscription Watch

# Draw Me a Picture!



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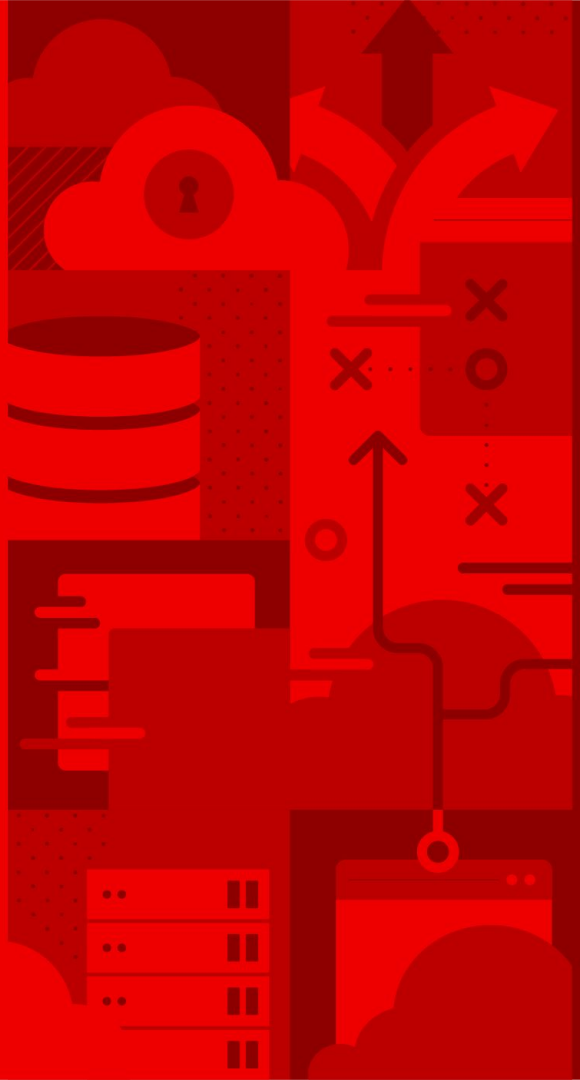

# Architecture

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# Architecture Overview

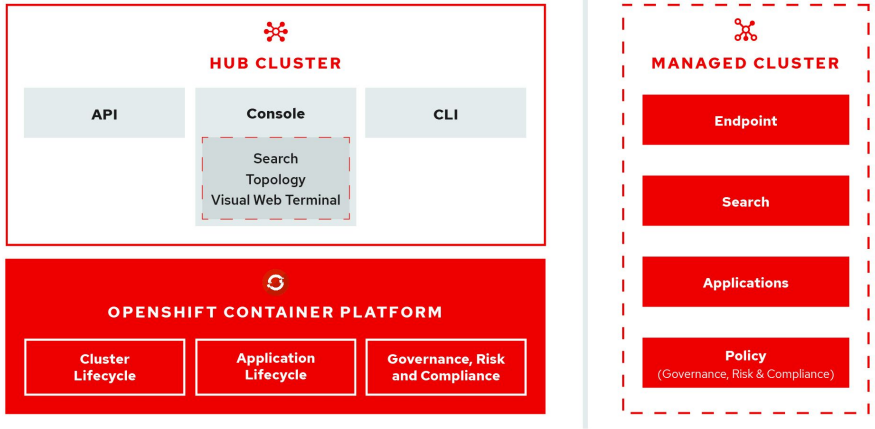
IT Operations

**Hub Architecture and Components**

- RHACM uses the multicluster-hub operator and runs in the open-cluster-management namespace

**Managed Cluster Architecture and Components:**

- RHACM managed clusters use the multi-cluster endpoint operator which runs in the multicluster-endpoint namespace



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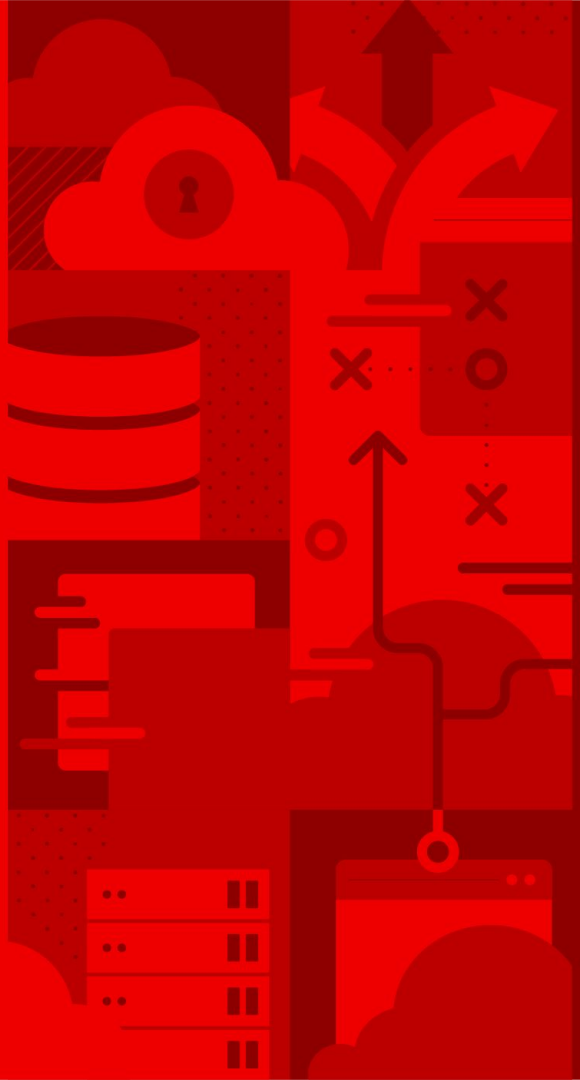

# Installation

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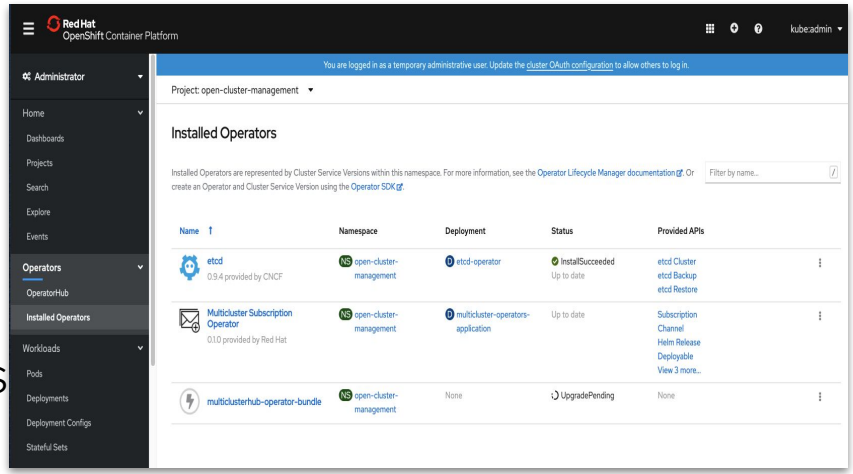
# Installation and Foundation

## Operator Install for Hub

### Hub Cluster

- Operator based installation
- Available on OperatorHub.io
- Requires OCP 4.3.5 or OCP 4.4.x




### Manage Kubernetes compliant clusters

- OpenShift 3.11, 4.1.x - 4.4.x
- Public cloud hosted: OCP
- Public cloud managed kubernetes: EKS, AKS, GKE, IKS

### High Availability

- Supports OCP Availability Zone
- Limitation for Search component based on RedisGraph

### Resource Requirements

- Test: 1 master, 2 workers, 4CPU and 16GB RAM
- Production: 3 masters, 16CPU and 128GB RAM
  - Production requirements vary based on number of clusters in the management domain and types of workloads being run



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# Installation and Foundation

## Operator Install for Managed Cluster

IT Operations

**Managed Cluster**

- The multicluster-endpoint operator controls the deployment of components on the managed cluster.
- List of included components:
  - Application Manager - agent for application  management
  - Connection Manager - allows components to connect to the hub
  - Work Manager - executes remote actions from the hub
  - Policy Controller - agent for security GRC
  - Search Collector - agent for dynamic search
  - Service Registry - service discovery
  - IAM Policy controller - controller for IAM Policy
  - Certificate Policy Controller - controller for certificate expiration policy
  - CIS Policy Controller - controller for CIS policy

# Thank you

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